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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/766,812	01/30/2004	Yu-An Li	BHT-3244-25	3138

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TROXELL LAW OFFICE PLLC
SUITE 1404
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FALLS CHURCH, VA 22041

EXAMINER

LIN, JAMES

ART UNIT	PAPER NUMBER
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1792

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/766,812	Applicant(s) LI ET AL.	
	Examiner Jimmy LIN	Art Unit 1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 November 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 6-10 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 6-10 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claims 6-10 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

There is no support for controlling the viscosity of the phosphors spray between 10 and 20 cPs. The specification only seems to teach that the *solvent* can have a viscosity between 10 and 20 cPs (pg. 9, lines 11-13). The viscosity of the phosphor spray, having added components to the solvent, would *not* necessarily maintain the same viscosity of the solvent.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. Claims 6-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hibino et al. (U.S. Patent No. 6,800,010) in view of Tai et al. (U.S. Patent No. 6,391,504) and Doi et al. (U.S. Publication No. 2003/0008080).

Hibino teaches a method of spraying phosphor ink from a nozzle onto a substrate. Phosphor powder is mixed with solvent in order to form phosphor ink (col. 12, lines 28-35). The phosphor ink is deposited on the anode (Figs. 1-2).

Hibino does not explicitly teach vaporizing the solvent within the range of predetermined temperatures. However, the deposition step occurs over a finite period of time and at least some of the solvent will necessarily evaporate because of the relatively high volatility of solvents.

Hibino does not explicitly teach repeating the steps of spraying the phosphor and vaporizing the solvent. However, additional spraying of the phosphor would yield predictable results of increasing the thickness of the phosphor layer. Additionally, repetition of the deposition step was well known to those of ordinary skill in the art to create a layer of desired, even thickness. It would have been obvious to one of ordinary skill in the art at the time of invention to have repeated the spraying of the phosphors onto the substrate in order to have formed a phosphor layer with a desired thickness. The repetition of the phosphor spray would have necessarily created an additional step of vaporization of the solvent because the solvent would necessarily evaporate due to its volatility.

Hibino does not explicitly teach that the viscosity of the phosphor spray is controlled between 10 and 20 cPs. However, Tai teaches that a solution having too low of a viscosity would not allow a film to be properly formed toward the edges [0076] while Doi teaches that too high of a viscosity can clog a nozzle (col. 10, lines 20-32). Thus, Tai and Doi teach that viscosity is a result-effective variable. A particular parameter can be recognized as a result-effective variable, i.e., a variable which achieves a recognized result, and the determination of the optimum or workable ranges of said variable might be characterized as routine experimentation (see MPEP 2144.05.II.B.). Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to have determined the optimum or workable ranges for the viscosity of the phosphor spray of Hibino through routine experimentation in order

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to achieve a viscosity high enough to properly form a film at the edges and low enough so the nozzle does not become clogged.

Claims 7-8: The phosphor layer is exposed to a firing process at a temperature of around 500 °C (col. 12, lines 37-38). The hardening of the film allows the phosphor to adhere to the substrate.

6. Claims 6 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yun et al. (U.S. Patent No. 6,447,908) in view of Tai '504 and Doi '080.

Yun teaches a method of depositing a phosphor onto a substrate of a field emission display. Phosphor particles are mixed with a solvent and can be formed on the substrate via a spraying method (abstract; col. 5, lines 16-22; col. 7, lines 17-20). The substrate being coated is an anode (col. 2, lines 45-46).

Yun does not explicitly teach vaporizing the solvent within the range of predetermined temperatures. However, such vaporization must necessarily occur for substantially the same reasons discussed above.

Yun does not explicitly teach repeating the steps of spraying the phosphor and vaporizing the solvent. However, such repetition of steps is obvious for substantially the same reasons as discussed above.

Yun does not explicitly teach that the viscosity of the phosphor spray is controlled between 10 and 20 cPs. However, such a viscosity range would have been obvious over Tai and Doi, as discussed above.

Claim 9: Yun does not explicitly teach wherein the phosphor spray is applied by a commercial spray gun. However, using a commercial spray gun (such as ATD Tools 6836 gravity feed spray gun, which has a nozzle diameter of 1.4 mm, an air flow rate of 160-300 L/min, and a solvent flow rate of 150-260 cc/min) was well known to those of ordinary skill in the art to simplify a spraying method, and hence would have been obvious to incorporate into the method of Yun.

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7. Claims 7-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yun '908 in view of Tai '504 and Doi '080 as applied to claim 6 above, and further in view of Chadha et al. (U.S. Patent No. 5,744,907).

Yun is discussed above, but does not explicitly teach a step of providing an adhesive process to obtain a phosphor layer. However, Chadha teaches that it is well known in the art of forming a phosphor layer in a field emission device to add a binder to the phosphor material (abstract; col. 2, lines 65-67). The binder is exposed to a heating process (i.e., a sintering process) so that the binder binds the phosphor particles to each other and to the substrate (col. 2, lines 42-45; col. 3, lines 5-9). Because Chadha teaches that the addition of such binders to a phosphor layer is operable in the art, it would have been obvious to one of ordinary skill in the art at the time of invention to have added the binders of Chadha to the phosphor spray of Yun with a reasonable expectation of success. One would have been motivated to do so in order to have bound the phosphor particles to each other and to the substrate.

8. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yun '908 in view of Tai '504, Doi '080, and Chadha '907 as applied to claim 7 above, and further in view of Kendall et al. (U.S. Publication No. 2003/0017797).

Yun and Chadha are discussed above. Yun teaches that the phosphor particles can have a particle size of 0.5-20.0 μm (col. 6, lines 47-50) and that the electrical powder can also be 0.5-20.0 μm (col. 6, lines 57-58).

Chadha teaches the use of binders but does not explicitly teach any particle size of the binders, much less that a particle size can be less than about 0.2 μm as claimed. However, Chadha does teach that polyvinyl alcohol (PVA) can be the particular binder. Kendall teaches that PVA can have particle sizes ranging from 0.05-500 μm [0044]. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to have used PVA as the particular binder with a particle size between 0.05 and 0.2 μm with a reasonable expectation of success because Kendall teaches that such a range of particles sizes is well known for PVA.

Yun does not explicitly teach that the phosphor layer coated on the anode has a thickness of between about 1.5 and 2.5 μm . However, Yun does teach that the phosphor layer can be two phosphor particles in thickness (Fig. 3B). Considering that Yun teaches particle sizes of the

phosphor particles to be in the range of 0.5-20.0 μm , the two-phosphor particle layer would have a thickness in the range of 1.0-40.0 μm .

Response to Arguments

9. Applicant's arguments filed 11/23/2007 have been fully considered but they are not persuasive.

Applicant argues that the prior art of record do not teach or suggest controlling a viscosity of the phosphors spray between 10 and 20 cPs. However, the teachings of Tai and Doi suggest that the viscosity of a spray is a result-effective variable, as discussed above.

Conclusion

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

http://www.autoprotools.com/products/Paint_Equipment/dsp_auto_tool_productDetail.cfm?PKUID=717 shows the specification of the ATD-6836.

<http://web.archive.org/web/20040609232429/http://www.small-business-help.com/spray-gun.html> shows that the ATD-6836 was for sale to the public by 12/22/2003.

11. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jimmy LIN whose telephone number is (571)272-8902. The examiner can normally be reached on Monday thru Friday 8AM - 5:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tim Meeks can be reached on 571-272-1423. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Timothy H Meeks/
Supervisory Patent Examiner, Art Unit 1792

/Jimmy Lin/
Examiner, Art Unit 1792